Changes in the Cost of Bank Equity and the Supply of Bank Credit

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Motivation

- When in distress, highly leveraged banks generate negative externalities

- Reducing leverage by higher capital requirements, however, have negative effects on bank lending:

  Berrospide and Edge (IJCB 2010), Aiyar, Calomiris and Wieladeck (JMCB, 2014), Fraisse, Lé, Thesmar (2015), Behn, Haselmann, Wachtel (JF, 2016), Berrospide, Black, and Keeton (2016), de Jonghe, Dewachter, Ongena (2016), Jiménez, Ongena, Pedro, Saurina (JPE, 2016), …

- At the same time, tax systems provide incentives for banks to borrow more than they otherwise would (interest deduction)

- An alternative to increasing capital requirements is, therefore, a decrease in the relative cost of equity

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- An alternative to increasing capital requirements is, therefore, a decrease in the relative cost of equity

➔ **What is the effect on bank balance sheet and lending?**

Identification Challenge

- We need:

1. A shock that affects both the cost of equity and the cost of debt, so that the cost of capital is unchanged

2. A shock that affects only a subset of banks, and neither firms nor households

Identification Challenge

- We exploit unique features of the European banking system:

    1. Banks are subject to the same regulation, but to different tax systems

    2. Various tax reforms that affect the cost of equity have been adopted from 2000 to 2012

    3. Banks are actively lending abroad: we can compare lending by an affected banks versus non affected banks in a market that is not affected by the reform

How to Decrease the Relative Cost of Equity?

Two Reforms, Two Designs

1. ***Allowance for Corporate Equity =>*** Symmetric tax treatment between debt and equity

    - The regulator defines a notional interest rate R
    - R × Book Value of Equity is deducted from income before taxes
    - Applied in **Italy** and **Belgium** in **1997** and **2006** respectively
    - Two possible channels:
        - Cost of Capital Effect: **Lower** cost of capital
        - Capital Structure Effect: **Higher** equity ratios

How to Decrease the Relative Cost of Equity?

Two Reforms, Two Designs

2. ***Bank Levy=>*** Tax on total liabilities net of equity

   - Staggered Introduction in **7 European countries** from **2010 to 2012**
   - Different intensity across banks within a country
   - Increases the cost of funds
   - Two possible channels:
     - Cost of Capital Effect: **Higher** cost of capital
     - Capital Structure Effect: **Higher** equity ratios

Findings

Decreasing the cost of equity leads banks to...

- Increase the reliance on equity financing (Schepens, 2016; Devereux, 2017)
- Shift the composition of their balance sheet to assets that are more costly to hold in terms of capital charge: corporate loans
- Supply more credit to firms

Balance Sheet Composition

Methodology

- Data: Bank data from Bankscope
- Sample: Control group of European banks obtained through propensity score matching based on the value before the shock of
  - Total Assets at t
  - Equity Ratio at t and $t - 1$
  - The equity ratio and total asset growth rates at t and $t - 1$
  - GDP growth

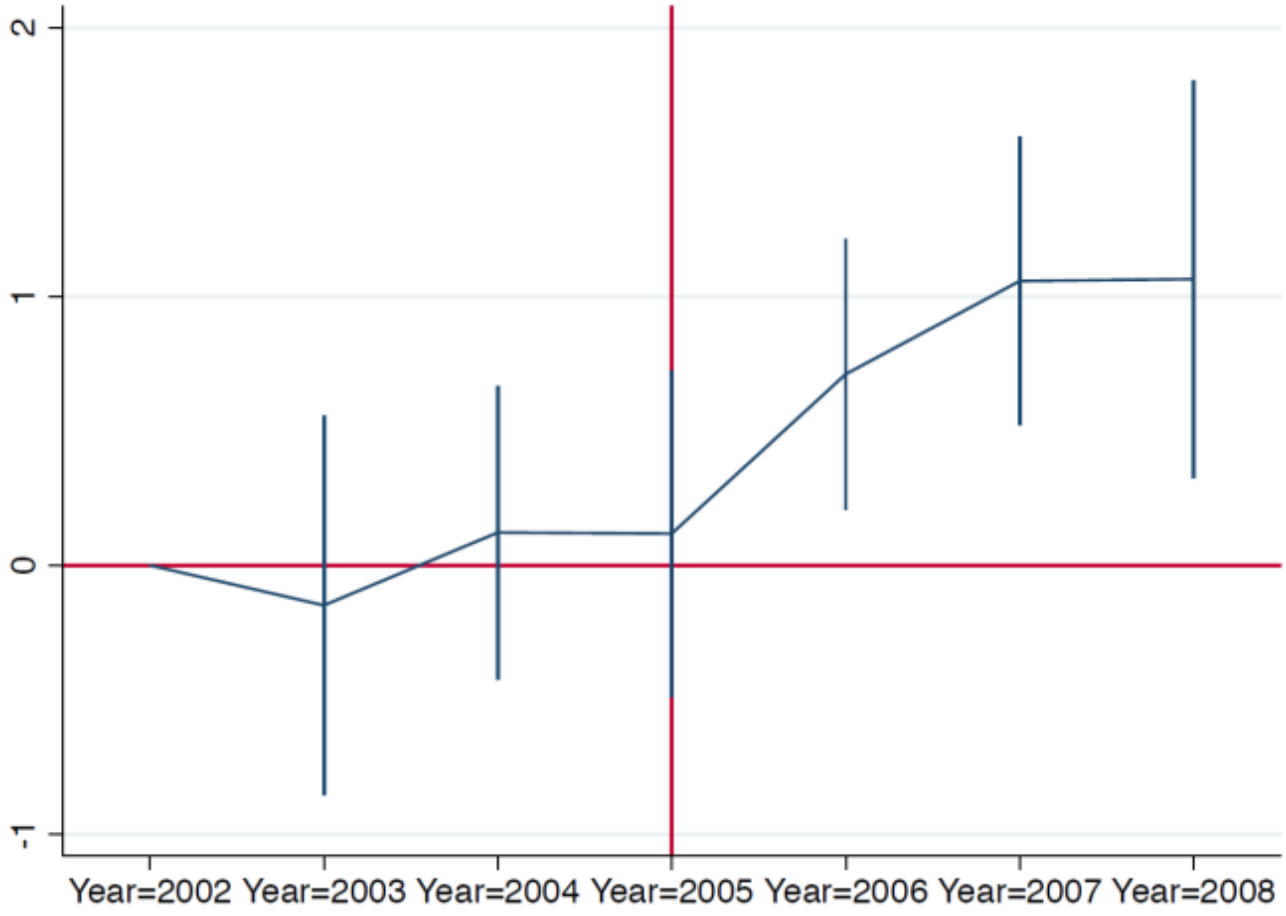
ACE: Model

- Model:

$$\text{Log}(\text{ Equity Ratio}_{b,t}) = \alpha + \eta \text{Treated}_{b,t} \times \text{Post}_t + \lambda Y_{b,t-1} + \gamma C_{c,t} + \mu_t + \mu_b + E_{b,t}$$

- Bank and year fixed effects
- Time varying bank Controls: Return on Assets, Total Asset, Total Asset squared, Total Asset growth, Non interest income share (all lagged)
- Time varying country controls: GDP growth, GDP per capita, CPI
- Cluster: Bank

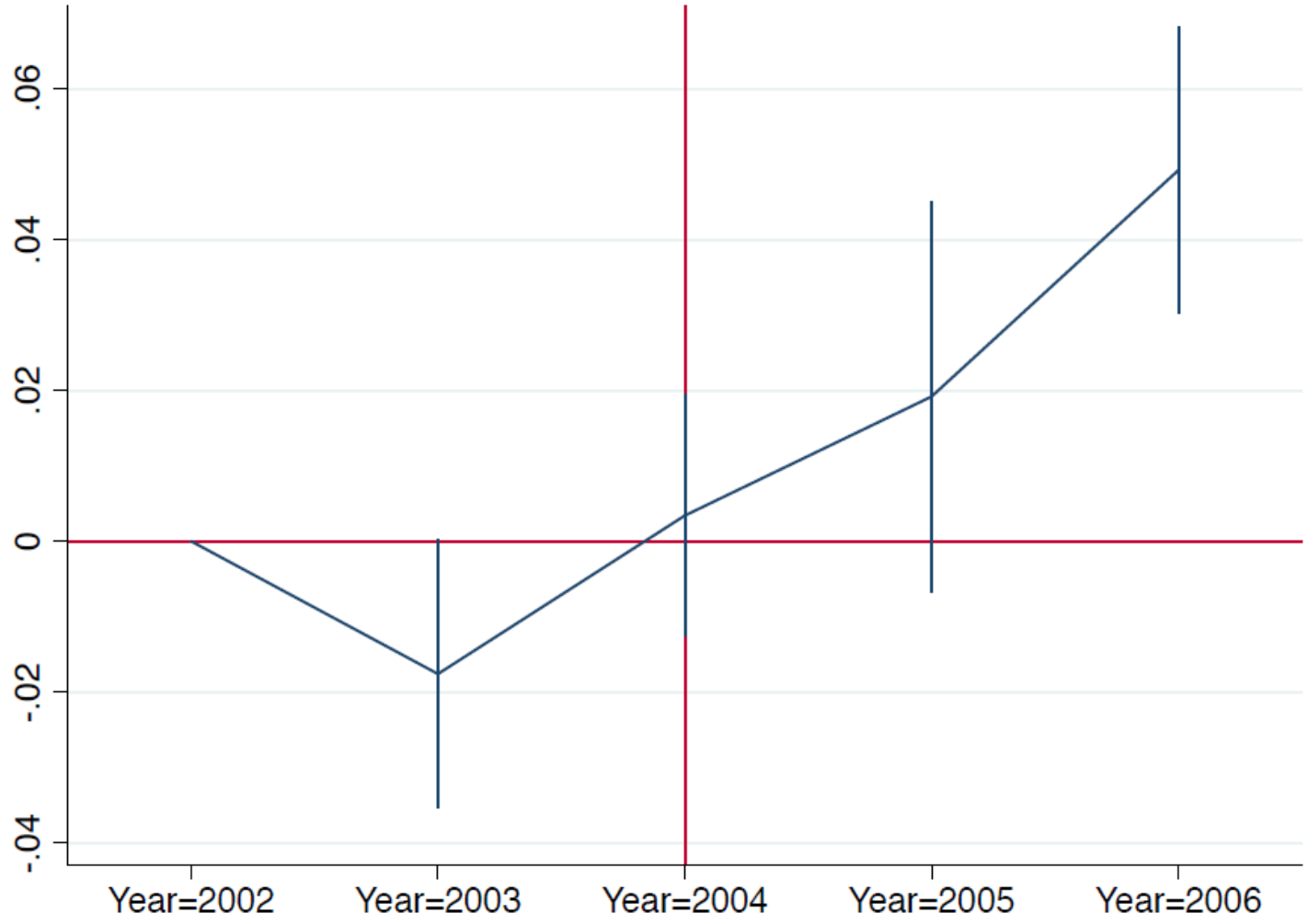
Introduction of the Belgian ACE and Bank Equity Ratios



Equity to asset ratio increases by 1 percentage point (from 6%)

- Limited effect if we think that equity and debt are treated equally
- Potentially large impact on bank lending if banks are constrained by equity ratios

Introduction of the Belgian ACE and Loan to Asset Ratios



Loan to asset ratio increases by 4 percentage points (from 60%)

Bank Levy: Model

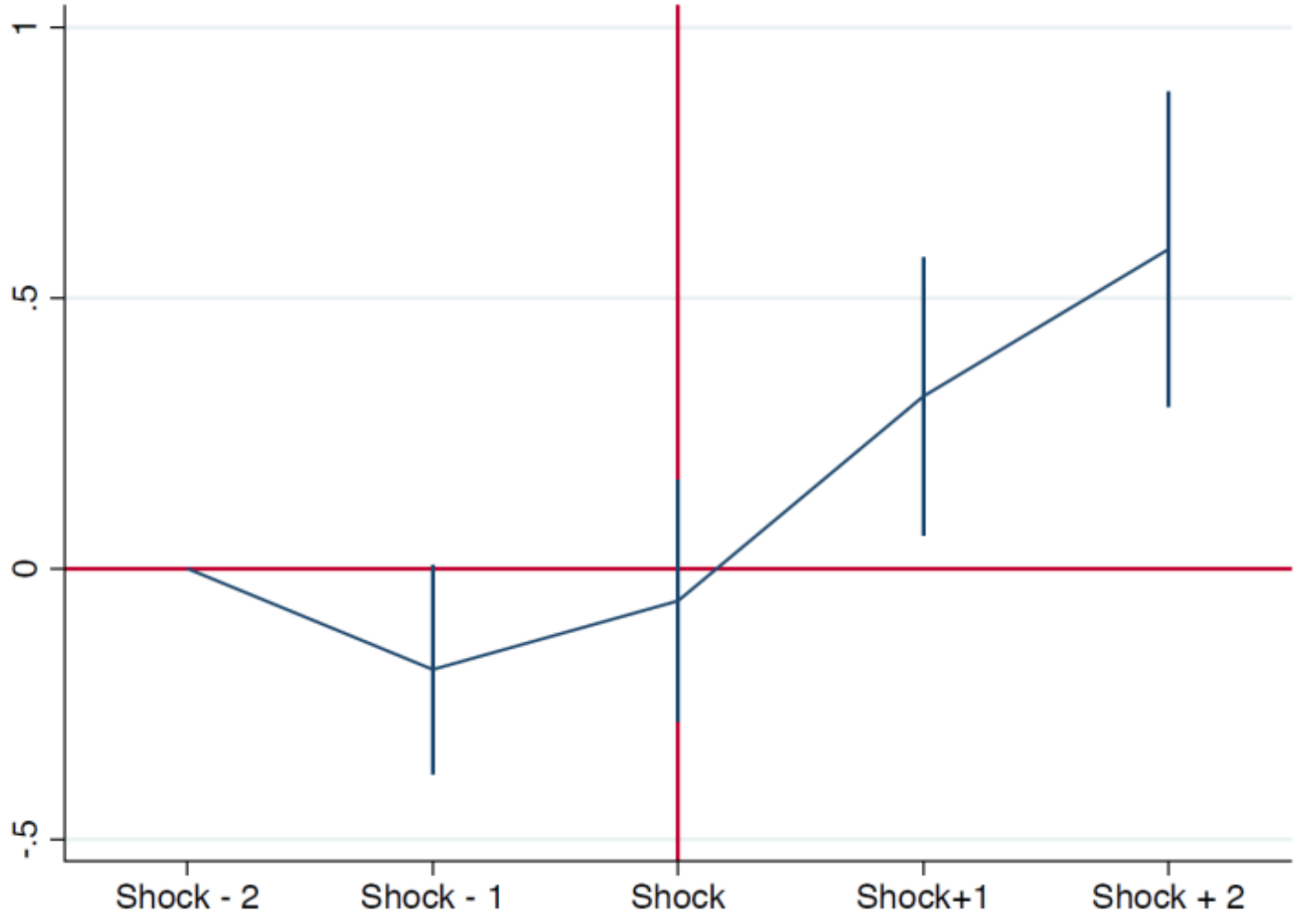
- Same model as before BUT only a subset of banks are treated (above 20 billion in total liabilities):

$$\text{Log}(\text{ Equity Ratio}_{b,t}) = \alpha + \eta \text{Intensity}_{b,t} \times \text{Post}_t + \lambda Y_{b,t-1} + \gamma C_{c,t} + \mu_t$$

$$+ \text{Year}_t \text{ X Size b} + \text{Year}_t \text{ X } C_c + E_{b,t}$$

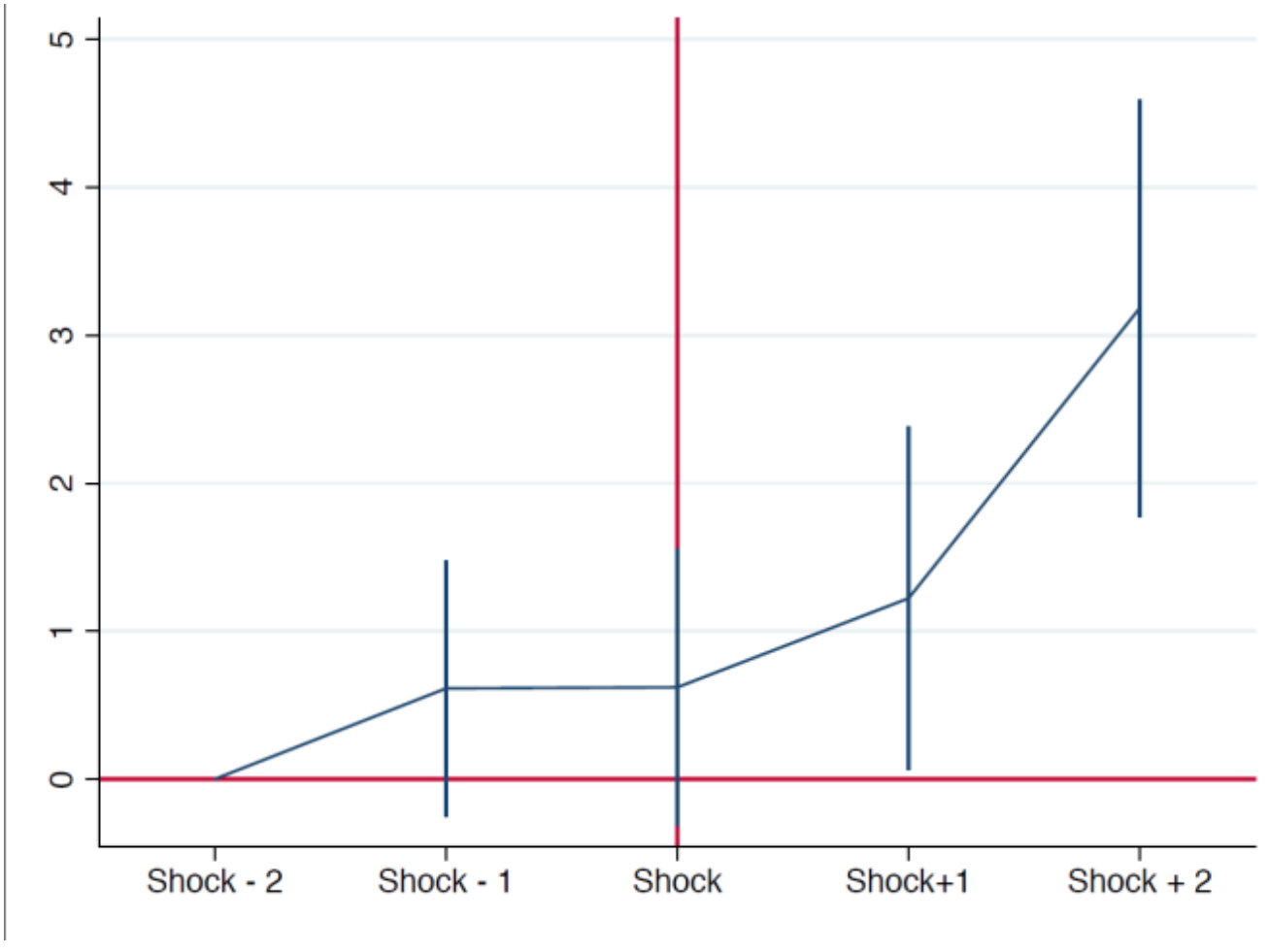
- Dif-in-Dif-in-Dif: We compare
  - The difference between large banks and small banks
  - After versus before the levy
  - in a country that applied the levy versus a country that did not

Effect on Bank Equity Ratios



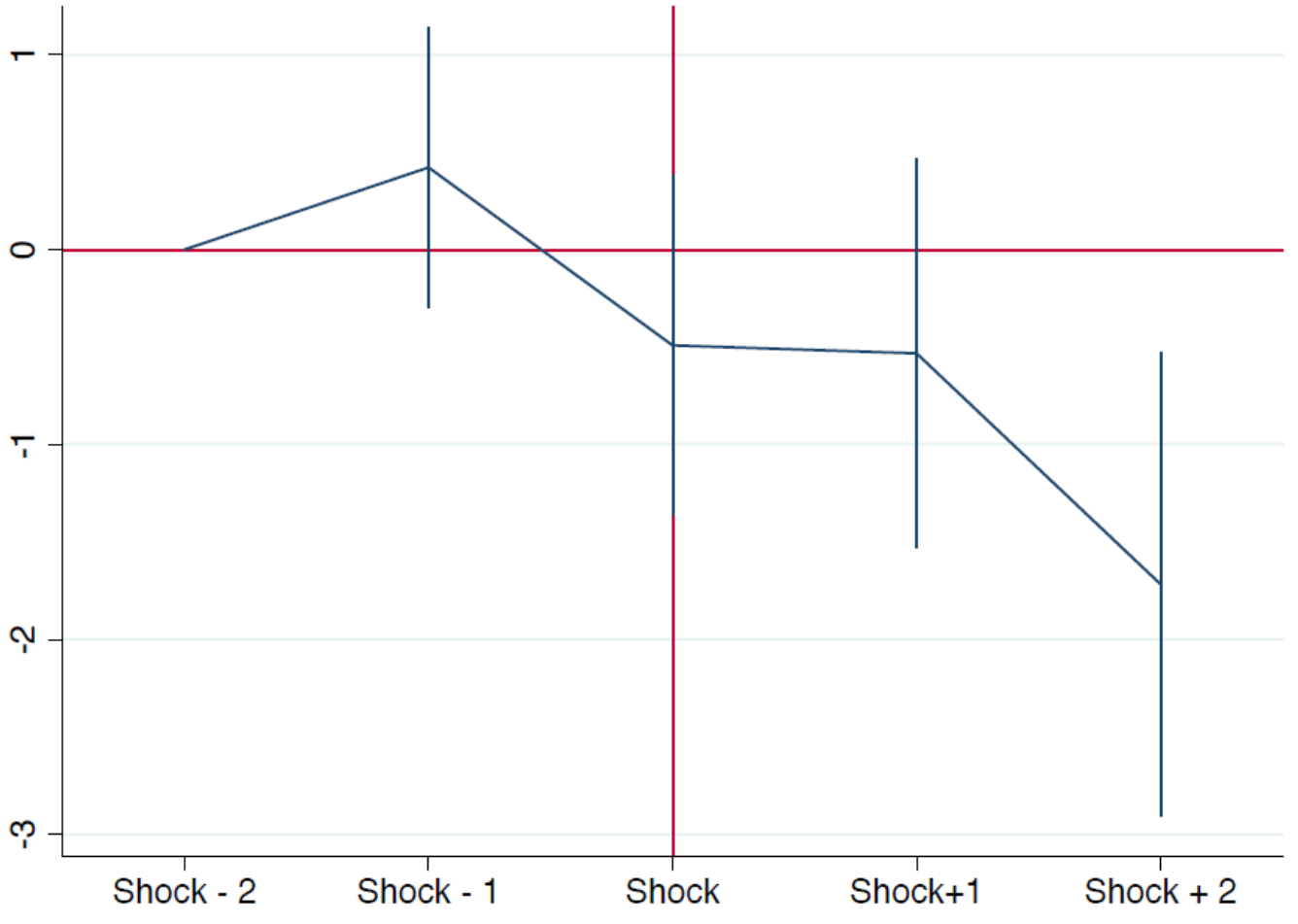
Equity to asset ratio increases by 0.7 percentage point

Effect on Loan to Asset Ratio



Loan to asset ratio increases by up to 3 percentage points (from 68%)

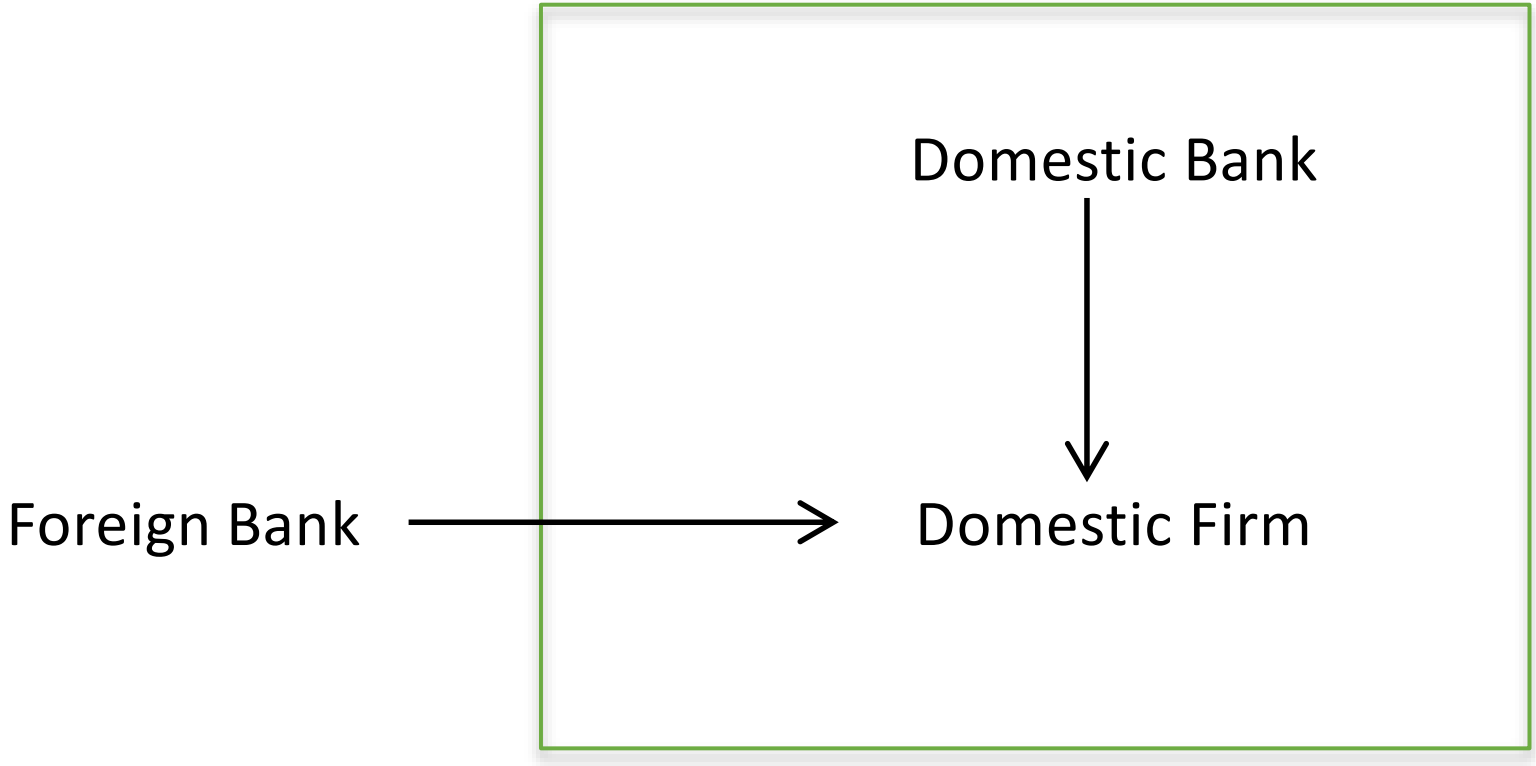
Effect on Security to Asset Ratios



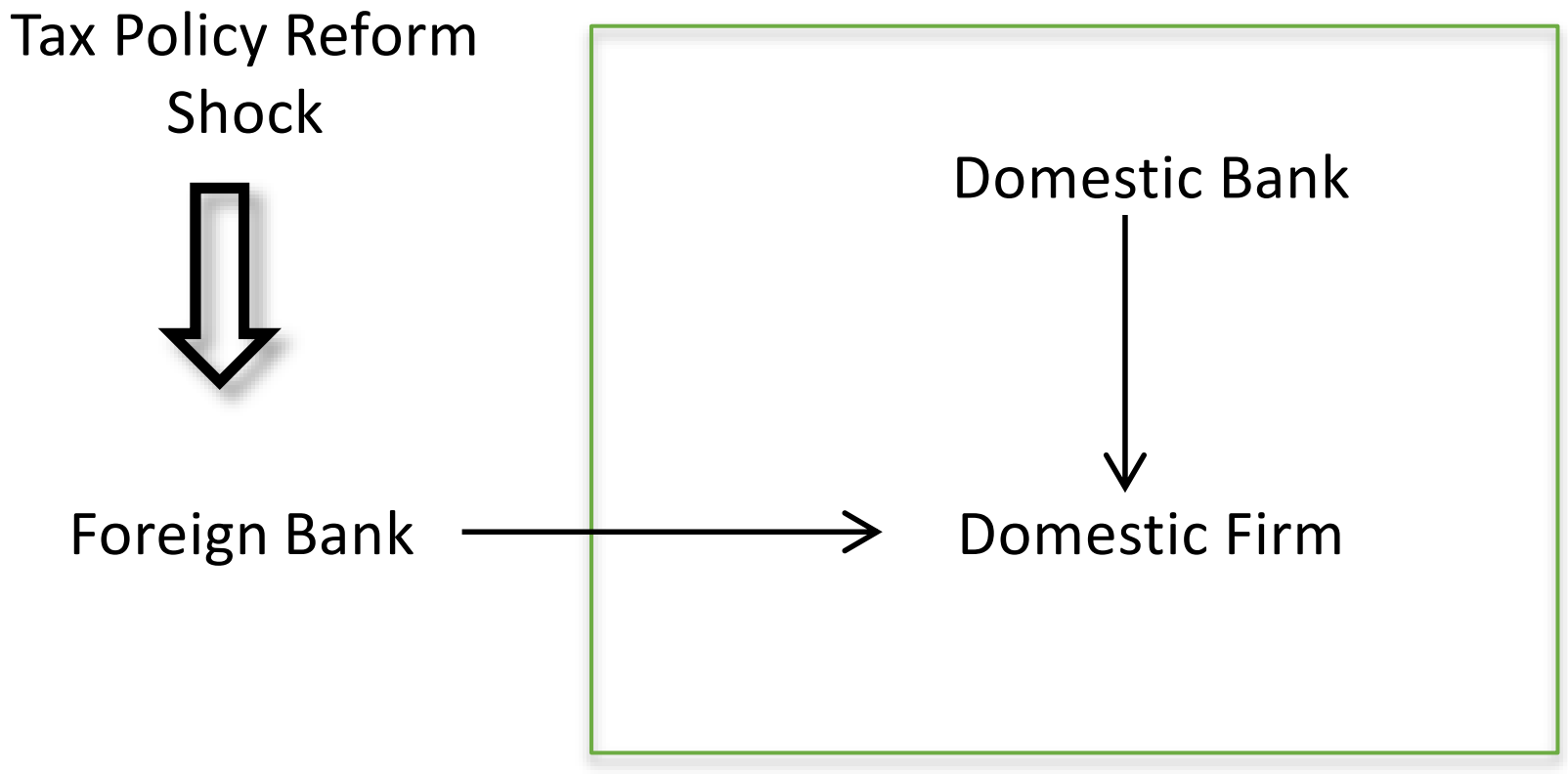
Security to asset ratio decreases by up to 3 percentage points (from 25 %)

Credit Supply

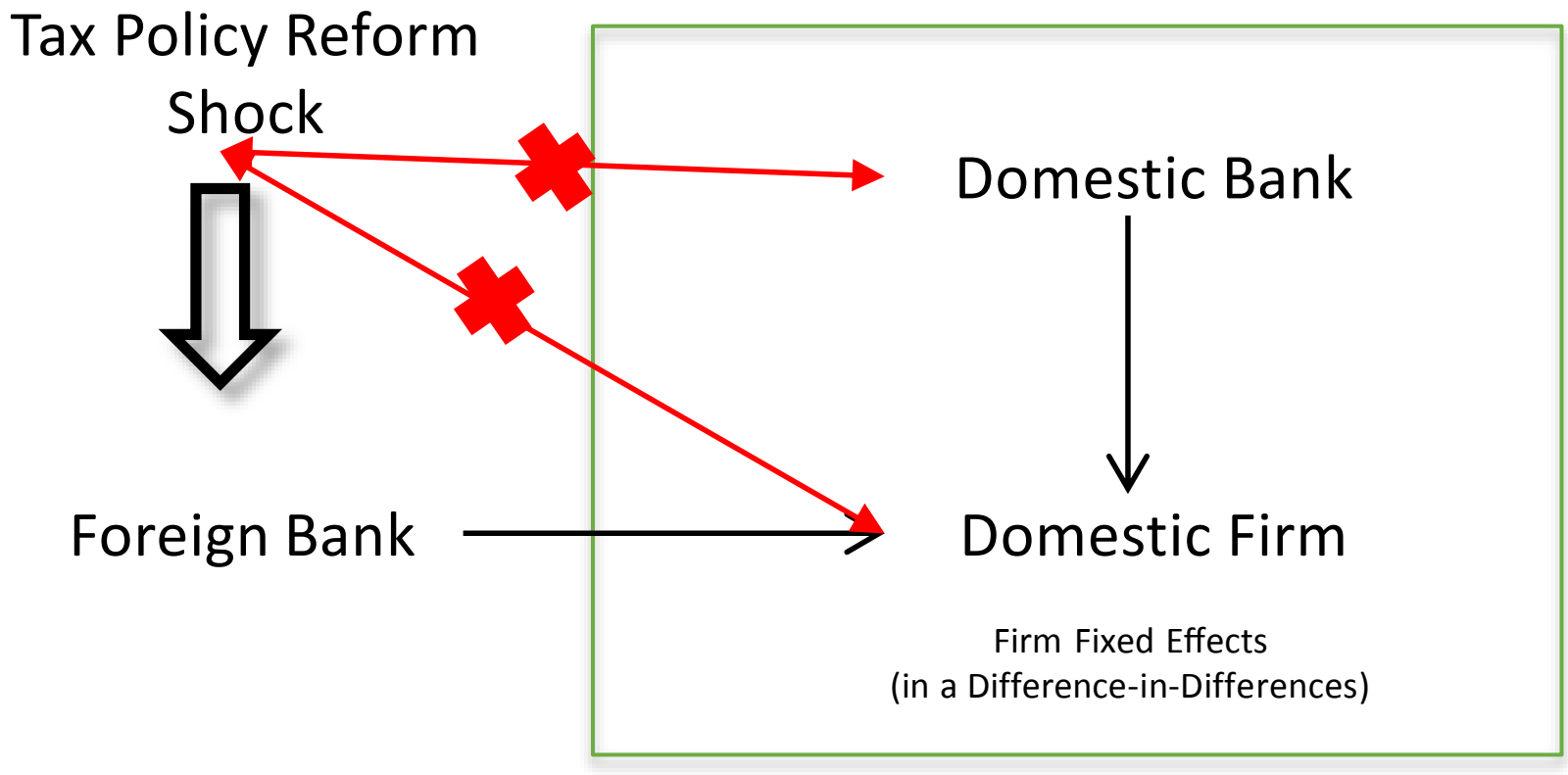
Identification Strategy



Identification Strategy



Identification Strategy



Lending Analysis: German Credit Register Data

- Quarterly panel of bank-firm pairs
- All bank-firm exposures initially above 1.5 million euros
- Firms that borrowed at least once from banks in two countries

  are likely large and credit exposure hurdle not so binding

  we back-fill exposures to create a balanced panel

e.g., Schertler, Buch, Westernhagen (IEEP, 2006), Hayden, Porath, Westernhagen (JFSR, 2007), Ongena, Tümer-Alkan, von Westernhagen (EER, 2012)

Methodology: Differences-in-differences Estimation

- Two Sub Periods (collapsed): One year before, two years after

Bertrand, Duflo, Mullainathan (QJE, 2004)

- Model:

$$\Delta \log L_{b,f} = \alpha Treated_{b,f} + \beta X_f + \gamma Y_b + \lambda R_{b,f} + E_{b,f}$$

- Variables:
  - $L_{b,f}$: Credit exposure of bank *b* to firm *f* (average in the pre and post periods)
  - *Treated* : Dummy indicating if the bank has been treated by the change in equity cost
  - X_f, Y_b, $R_{b,f}$: respectively firm, bank and relationship characteristics (or fixed effects)


Exposure of German Firms to Belgian Banks
2006: Introduction of the ACE in Belgium
Share of loans from Belgium banks in %
.1
.12
.14
.16
2004q1
2005q1
2006q1
2007q1
2008q1
Date

ACE and Bank Lending in Germany

Model	*All Bank-Firm Exposures*		*Foreign Lending*		*Intensive Margin*		*Extensive Margin*		
Dependent Variable	Δ log(Loan Exposure)		Δ log(Loan Exposure)		Δ log(Loan Exposure)		New Loan Dummy		
	OLS		*OLS*		*OLS*		*OLS*		Logit
Sample	All	Multibank Firms	All	Multibank Firms	All	Multibank Firms	All	Foreign	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	0.74** (0.35)	0.66** (0.27)	0.58* (0.35)	0.39** (0.25)	0.57* (0.30)	0.44** (0.21)	0.07** (0.03)	0.06** (0.03)	0.33* (0.14)
Firm FE	-	Yes	-	Yes	-	Yes	-	-	-
Firm Characteristics	Yes	-	Yes	-	Yes	-	Yes	Yes	Yes
Bank Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relationship Ch.	-	-	-	Yes	Yes	-	-	-	
Observations	127,831	110,759	22,162	22,162	6,314	6,183	127,831	22,162	127,831
R^2	0.110	0.399	0.207	0.207	0.048	0.320	0.129	0.141	0.103

Lending by affected banks varies significantly

- When compared to all or foreign banks
- On both margins
- Consistent on evidence that shocks are amplified abroad


Exposure of German Firms to Italian Banks
2002: Phasing out of the ACE in Italy
Share of loans from Italy banks in %
.2
.25
.3
.35
2000q1
2001q1
2002q1
2003q1
2004q1
Date

Bank Levies and Bank Lending in Germany

Model	*All Bank-Firm Exposures*		*Foreign Lending*		*Intensive Margin*		*Extensive Margin*		
Dependent Variable	log(Loan Exposure)		log(Loan Exposure)		log(Loan Exposure)		New Loan Dummy		
	OLS		*OLS*		*OLS*		*OLS*		Logit
Sample	All	Multibank Firms	All	Multibank Firms	All	Multibank Firms	All	Foreign	All
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated × Post	0.83***	0.55***	0.82**	0.56*	0.58***	0.55***	0.00**	0.00	0.12*
	(0.20)	(0.15)	(0.41)	(0.31)	(0.19)	(0.15)	(0.00)	(0.00)	(0.06)
Bank-Firm Exposure FE	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-
Firm × Quarter FE	-	Yes	-	Yes	-	Yes	-	-	-
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Characteristics	-	-	-	-	-	-	Yes	Yes	Yes
Bank Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relationship Ch.	-	-	-	-	-	-	Yes	Yes	Yes
Observations	3,392,091	3,007,207	657,049	148,234	3,183,166	2,998,801	3,392,093	657,049	3,392,093
R^2	0.583	0.700	0.621	0.776	0.577	0.700	0.017	0.021	0.060

Conclusion

Tentative Conclusions

- This paper is the first to study the impact of exogenous changes in the cost of equity on bank lending
- Lower equity cost leads to more bank lending to firms
- Increase in lending driven by lower constraints on bank balance sheet

Policy Implications

- Fiscal policy might be part of a solution for financial stability/ a credible substitute to tightening capital requirements

- Does higher lending to firms lead to excessive portfolio risk?

Thank you!